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BEC501

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Technological Innovation and Management Entrepreneurship

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Management. Explain the functions or process of management.	10	L2	CO1
	b.	Explain the various roles of manager.	10	L2	CO1
		OR			
Q.2	a.	List and explain the various steps in planning.	10	L2	CO1
	b.	List and explain the various types of decisions.	10	L2	CO1
		Module – 2			
Q.3	a.	Briefly explain the process of organizing.	10	L2	CO2
	b.	Describe the different steps in the selection procedure.	10	L2	CO2
		OR			
Q.4	a.	Explain Herzberg's TWO-FACTOR-THEORY.	10	L2	CO2
	b.	Discuss the techniques of coordination in detail.	10	L2	CO2
		Module – 3			
Q.5	a.	Illustrate the social responsibilities of business towards different groups.	10	L2	CO3
	b.	Discuss about corporate governance and benefits of good corporate governance.	10	L2	CO3
		OR			
Q.6	a.	What are the characteristics of a successful entrepreneur?	10	L2	CO3
	b.	Illustrate the problems faced by entrepreneurs.	10	L2	CO3
		Module – 4			
Q.7	a.	Discuss role of small scale industries along with Globalization and the WTO on SSI.	10	L2	CO4
	b.	Enumerate and list the external and internal problems faced by small-scale industries.	10	L2	CO4

		OR			
Q.8	**a.**	Discuss how to generate business ideas.	**10**	**L2**	**CO4**
	b.	Explain how to identify a business opportunity in detail.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the following: i) Financial plan ii) Marketing plan	**10**	**L2**	**CO5**
	b.	Discuss why do some business plan fail in detail.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Discuss venture capital meaning in detail.	**5**	**L2**	**CO5**
	b.	Explain importance of network analysis.	**5**	**L2**	**CO5**
	c.	Explain the steps in PERT along with advantages and limitations of PERT.	**10**	**L2**	**CO5**

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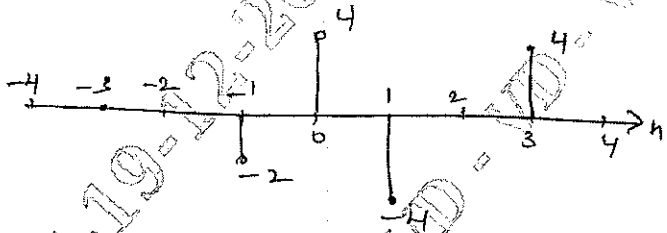
BEC502

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Digital Signal Processing

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	A discrete time signal x(n) is shown below Fig.Q1(a). Sketch (i) $2x(n-2)$ (ii) $3-x(n)$ (iii) $2x(-n)-4$  Fig.Q1(a)	08	L3	CO1
	b.	Determine whether each of the following signals is periodic or not. If periodic find the fundamental period. (i) $x(n) = \sin(3n)$ (ii) $x(n) = \cos(0.3\pi n + \pi/4)$ (iii) $x(n) = \sin\left(\frac{7\pi n}{37}\right)$	06	L3	CO1
	c.	Write a program to generate the following discrete time signals: (i) Unit sample sequence (ii) Exponential sequence (iii) Random sequence	06	L3	CO1
		OR			
Q.2	a.	The following are the impulse response of discrete time LTI systems. Determine whether each system is memoryless, causal and stable. (i) $h(n) = e^{-n}\cos(n) * u(n)$ (ii) $h(n) = (0.99)^n * u(n+3)$ (iii) $h(n) = (1/2)^n * u(n)$	09	L3	CO2
	b.	Determine whether the following systems represented by impulse response are causal and stable: (i) $h(n) = 5\,\delta(n)$ (ii) $h(n) = (1/4)^{\lvert n\rvert}$ (iii) $h(n) = (1/2)^{-n}u(-n)$	06	L3	CO1
	c.	Write a program to perform the following operation on signals: (i) Signal addition (ii) Signal multiplication (iii) Scaling (iv) Shifting (v) Folding	05	L3	CO1
		Module – 2			
Q.3	a.	Explain the frequency domain sampling of discrete time signals and obtain the DFT and IDFT expressions.	08	L2	CO3
	b.	Find the 4 point DFT of the sequence x(n) = [1, 0, 0, 1] using matrix method and verify the answer by taking the 4-point IDFT of the result.	06	L3	CO3
	c.	Find the 4 point DFT of $x(n) = \cos\frac{\pi n}{4} + \sin\frac{\pi n}{4}$ using linearity property.	06	L3	CO3

		OR			
Q.4	**a.**	Show that the multiplication of two DFT's lead to circular convolution of the corresponding time sequences.	**06**	**L2**	**CO3**
	b.	Consider the finite N sequence $x(n) = \delta(n) + 2\delta(n-5)$ Find (i) The 10 point DFT X(k) (ii) The sequence that has a DFT $Y(k) = e^{\frac{-j4\pi k}{10}} X(k)$ (iii) Find the 10 point sequence y(n) that has DFT Y(k) = X(k)W(k) where X(k) is the 10 point DFT of x(n) and W(k) is the 10 point DFT of $w(n) = u(n) - u(n-7)$.	**06**	**L3**	**CO3**
	c.	Find the circular convolution of sequences $x_1(n) = [1, 2, 3, 1]$ and $x_2(n) = [4, 3, 2, 1]$ using time domain approach and verify the result using frequency domain approach.	**08**	**L3**	**CO3**
		Module – 3			
Q.5	**a.**	State and prove the following properties : (i) Circular time shift of a sequence (ii) Parseval's Theorem	**06**	**L2**	**CO1**
	b.	Find the output y(n) of a filter whose impulse response is h(n) = [1, 1, 1] and the input signal x(n) = [3, –1, 0, 1, 3, 2, 0, 1, 2, 1] using overlap save method. Assume the length of each block N is 5.	**07**	**L3**	**CO3**
	c.	Given x(n) = [1, 2, 3, 4, 4, 3, 2, 1] . Find X(k) using Radix – 2 DIT-FFT Algorithm.	**07**	**L3**	**CO3**
		OR			
Q.6	**a.**	Derive the radix – 2 DIT-FFT algorithm and draw the signal flow graph for N = 8.	**08**	**L2**	**CO3**
	b.	Consider a FIR filter with impulse response h(n) = [3, 2, 1, 1] .If the input is x(n) = [1, 2, 3, 3, 2, 1 , –1, –2, –3, 5, 6, –1, 2, 0, 2, 1] , find the output y(n). Use overlap add method assuming the length of the block is 7.	**07**	**L3**	**CO3**
	c.	A length 8 sequence x(n) = [– 4, 5, 2, –3, 0, –2, 3, 4] with 8-point DFT given ny X(k). Determine the sequence y(n) whose 8-point DFT is given by $Y(k) = W_4^{3k} X(k)$.	**05**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	A low pass filter is to be designed for the desired frequency response $H_d(e^{jw}) = H_d(w) = \begin{cases} e^{-j2w} & \lvert w \rvert < \pi/4 \\ 0 & \pi/4 < \lvert w \rvert < \pi \end{cases}$ Determine the filter coefficients $h_d(n)$ and h(n) if rectangular window is used. Also find the frequency H(w) of the resulting FIR filter.	**10**	**L3**	**CO4**
	b.	Determine the Direct form realization of the system function $H(z) = 1 + 2z^{-1} - 3z^{-2} + 4z^{-3} + 5z^{-4}$	**04**	**L3**	**CO4**
	c.	Write a program to design digital low pass FIR filter using a window.	**06**	**L3**	**CO4**

		OR			
Q.8	**a.**	Design a FIR filter with desired frequency response $H_d(e^{jw}) = \begin{cases} e^{-j4w} & -\pi/4 \le w \le \pi/4 \\ 0 & \pi/4 \le \lvert w \rvert \le \pi \end{cases}$ Find filter specifications and transfer function using Bartlett window.	**10**	**L3**	**CO4**
	b.	Realize the system function in cascade form $H(z) = 1 + \frac{5}{2}z^{-1} + 2z^{-2} + 2z^{-3}$	**04**	**L3**	**CO4**
	c.	Write a program to design digital high pass FIR filter using a window.	**06**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Design an analog Butterworth lowpass filter that has – 2dB or better (ie., lesser than – 2 dB) at frequency of 20 rad/sec and atleast – 10 dB of attenuation at 30 rad/sec.	**10**	**L3**	**CO5**
	b.	Obtain the direct form – I and direct form – II structure for the filter given by system function $H(z) = \frac{1 + 0.4z^{-1}}{1 - 0.5z^{-1} + 0.06z^{-2}}$	**04**	**L3**	**CO5**
	c.	Write a program to design digital IIR Butterworth low pass filter.	**06**	**L3**	**CO5**
		OR			
Q.10	**a.**	Design a digital Butterworth lowpass filter with frequency specifications given by (i) Passband ≤ 3.01 dB (ii) Passband edge frequency : 500 Hz (iii) Stopband attenuation ≥ 15 dB (iv) Stopband edge frequency : 750 Hz (v) Sampling rate $f_s = 2$ KHz Use Bilinear transformation metod.	**10**	**L3**	**CO5**
	b.	A filter is given by the difference equation $y(n) - \frac{1}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) + \frac{1}{2}x(n-2)$ Draw direct form – I and direct form – II realizations.	**04**	**L3**	**CO5**
	c.	Write a program to design digital IIR Butterworth high pass filter.	**06**	**L3**	**CO5**

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BEC503

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Digital Communication

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2 .M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What is Hilbert Transform? Summarize the properties of Hilbert Transform.	10	L2	CO1
	b.	Describe with the mathematical expression of canonical representation of Bandpass signals.	10	L2	CO1
		OR			
Q.2	a.	Tabulate the steps used in Gran-Schmidt orthogonalization procedure.	10	L2	CO1
	b.	Outline the detector diagram of correlation receiver.	10	L2	CO1
		Module – 2			
Q.3	a.	Derive an expression for probability of error calculation binary PSK using coherent detection.	10	L2	CO2
	b.	Explain with neat diagrams generation and coherent detection of QPSK signals.	10	L2	CO2
		OR			
Q.4	a.	Develop signal space diagram of M-array QAM for M = 16.	10	L3	CO2
	b.	Outline the generation and detection of non-coherent DPSK signals with a necessary diagram.	10	L2	CO2
		Module – 3			
Q.5	a.	Outline the properties of entropy. Derive an expression for average information content of symbols in long independent sequences.	10	L2	CO3
	b.	A source has an alphabet of 7 symbols with probabilities as given below : Symbol: S1 S2 S3 S4 S5 S6 S7 Probability: 1/4 1/4 1/8 1/8 1/8 1/16 1/16 Construct Huffman binary code and find its efficiency.	10	L3	CO3
		OR			
Q.6	a.	Briefly explain the following properties of mutual information i) Symmetry property ii) Non negativity property	10	L2	CO3
	b.	Derive an expression for Information Capacity Law.	10	L2	CO3

		Module – 4			
Q.7	**a.**	Consider a (6, 3) linear code whose generator of matrix is $G = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$ Calculate : i) All code vectors ii) All the hamming weight and distances iii) Minimum weight parity check matrix iv) Draw the encoder circuit.	**10**	**L3**	**CO4**
	b.	For a systematic (6, 3) linear block code, the parity matrix 'P' is given by $[P] = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ Calculate all possible vectors.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	The parity check bits of a (7, 4) Hamming code are generated by $C_5 = d_1 + d_3 + d_4$, $C_6 = d_1 + d_2 + d_3$, $C_7 = d_2 + d_3 + d_4$, where d_1, d_2, d_3 and d_4 are the message bits. i) Compute the generator matrix [G] and parity check matrix [H] for this code ii) Show that $GH^T = 0$.	**10**	**L3**	**CO4**
	b.	Briefly, explain the following terms Hamming weight, Hamming distance and minimum distance of LBC with suitable examples.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Consider the (3, 1, 2) convolutional code with $g^{(1)} = (110)$, $g^{(2)} = (101)$ and $g^{(3)} = (111)$. i) Draw the encoder block diagram ii) Calculate the generator matrix	**10**	**L3**	**CO5**
	b.	Briefly, describe the following terms : i) Code tree ii) Trellis graph iii) State Graph	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Describe the steps of viterbi algorithm in detail.	**10**	**L3**	**CO5**
	b.	Discuss with diagram of the following transconvolutional encoder, generator polynomial of path 1 and path 2.	**10**	**L3**	**CO5**

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BEC515D

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Satellite and Optical Communication

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Write short note on : 1. Apogee and Perigee distance 2. Umbra and Penumbra region of an eclipse	4	L1	CO1
	b.	Explain three Keplers law of planetary motion.	8	L2	CO1
	c.	Illustrate the concept of Injection velocity and resulting satellite trajectories with neat diagrams and expressions.	8	L2	CO1
		OR			
Q.2	a.	A satellite is moving in an elliptical orbit with the major axis equal to 42000 km. If the perigee distance is 8000 km, find the apogee and the orbit eccentricity.	4	L1	CO1
	b.	Describe different types of satellite orbit with respect to orientation of orbital plane and distance from earth.	8	L2	CO1
	c.	A satellite launched with an injection velocity V_1 from a point above the surface of the earth at a distance P from center of earth attains an elliptical orbit with an apogee distance A_1. The same satellite when launched with an injection velocity V_2 from the same perigee distance attains an elliptical orbit with an apogee distance A_2. Derive the relationship between V_1 and V_2 in terms of P , A_1 and A_2.	8	L2	CO1
		Module – 2			
Q.3	a.	Write short note on satellite subsystem.	5	L1	CO2
	b.	Explain with neat diagrams solar energy driven power system.	7	L2	CO2
	c.	Explain with suitable diagram, monopulse tracking and lobe switching techniques.	8	L2	CO2
		OR			
Q.4	a.	Write short note on Altitude and Orbit control.	5	L1	CO2
	b.	Explain earth station architecture with generalized earth station block diagram.	7	L2	CO2
	c.	Illustrate with neat schematic diagram, Tracking , Telemetry and Command subsystem.	8	L2	CO2

		Module – 3			
Q.5	**a.**	What are Communication related Application of satellites?	**4**	**L1**	**CO3**
	b.	Explain with neat block diagram transparent or bent pipe transponders.	**8**	**L2**	**CO3**
	c.	Describe with neat block diagram Satellite Cable Television.	**8**	**L2**	**CO3**
		OR			
Q.6	**a.**	List out any 5 advantages of satellite over Terrestrial Networks.	**4**	**L1**	**CO3**
	b.	Explain with neat diagrams Direct To Home (DTH) Satellite Television.	**8**	**L2**	**CO3**
	c.	Describe with neat block diagram, basic elements of a Satellite Communication system.	**8**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Consider a multimode step index optical fiber that has a core radius of 25 μm , a core index of 1.48 and an index difference $\Delta = 0.01$. Find the percentage of optical power that propagates in the cladding at 840 nm.	**5**	**L1**	**CO4**
	b.	Describe in detail about different fiber materials.	**7**	**L2**	**CO4**
	c.	Derive the expression for numerical aperture from Ray Theory.	**8**	**L2**	**CO4**
		OR			
Q.8	**a.**	Consider a multimode silica fiber that has a core refractive index $n_1 = 1.480$ and a cladding index $n_2 = 1.460$. Find i) Critical angle ii) the numerical aperture iii) the acceptance angle.	**5**	**L1**	**CO4**
	b.	Explain different types of bending losses.	**7**	**L2**	**CO4**
	c.	Illustrate with necessary diagram Mode theory for circular waveguide.	**8**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the principle of Operation of PIN photodiode.	**10**	**L2**	**CO5**
	b.	Illustrate the concept of diffraction grating with necessary diagram.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain with necessary diagram , the working principle of LASER diodes.	**10**	**L2**	**CO5**
	b.	Discuss about the Operational principles of WDM.	**10**	**L2**	**CO5**

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